UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: FEB 02 1981

SUBJECT: Emission Exchange Proposal - ARCO/SOHIO

FROM: Raymond Nye RCN
New Source Permits Section

TO: File

As a result of the "swap", it was felt that an in-house explanation and table be constructed to accompany the modifications in the PSD-1 and Waterflood PSD permits.

Background:

The first PSD permit (PSD-1) initially allowed the construction of eleven gas-fired turbines. Of those turbines, two 50 Mw units were assigned to the Central Power Station (CPS). The two 50 Mw units were later replaced in the Increment II application with four 25 Mw Units. Since the total horsepower from the CPS remained at 100 Mw, the Company was allowed to make the change without adding these turbines to the Increment II permit. The resulting physical transfer of the four 25 Mw units and the deletion of two 50 Mw turbines at CPS elevated the total number of turbine units to thirteen.

Discussion:

To counteract the increase in emissions and air quality impacts from equipment associated with the additional Waterflood facilities, the Company proposed that specific turbines at designated sites in PSD-1 not be installed. For clarification, Table 1 was devised to demonstrate the breakdown in increases and decreases associated with the proposal. It can therefore be shown in the emission exchange proposal that eight turbines from PSD-1 will not be constructed in order to offset the additional turbines and heaters needed in the Waterflood project. The additional nine turbines and various sized heaters to be added to the Waterflood permit can therefore be used to elevate the seawater temperature from 40°F to 80° F. Because the total heater capacity will be attained with multiple heaters that have individual capabilities ranging from 25 to 250 MM BTU/hr, the permit has been changed to reflect the total heater output in lieu of the numerical heater count. The total heater output for the Waterflood project will be limited to 2450 MM BTU/hr to allow flexibility in the Company's decision making process.

BACT, as described in both the Increment II and the Waterflood PSD permits, will be applied to the gas-fired turbines and heaters proposed in the swap.

TABLE 1

LOCATION	PSD 1	TPY (BACT)	I-2	Waterflood	Change	Total
Central Compression Plant	3@ 25 M hp	1463.5	1@ 25	--	-3@ 25 (PSD-1)	1@ 25
Flow Station #2	2@ 25	942	4@ 36 2@ 5	--	-2@ 25 (PSD-1)	4@ 36 2@ 5
Central Power Plant	(Replaced) 2@ 50	1282.7	(4@ 25)	--	-2@ 25 (PSD-1)	2@ 25
GC-2	2@ 325		2@ 3.5 1@ 1.4 4@ 22.6 3@ 26.6	--	194.6 +1@ 7.5	2@ 32.5 3@ 26.6 4@ 22.6 2@ 3.5 1@ 1.4 +1@ 7.5
GC-3	2@ 17	305	2@ 3.5 1@ 1.4 4@ 22.6	--	194.6 +1@ 7.5 -1@ 17 (PSD-1)	4@ 22.6 2@ 17 2@ 3.5 1@ 1.4
Seawater Treat. Plant	--		--	3@100*mmBTU/hr 2@ 60*mmBTU/hr	250 +3@100 mmBTU/hr	3@110 BTU/hr 3@100 BTU/hr 2@ 60 BTU/hr
Injection Plant East (AMCO)	--		--	5@ 16 2@ 50 mmBTU/hr	1039.4 +4@ 4 +1@ 25 + *750 mmBTU/hr	5@ 16 4@ 4 1@ 25 2@ 50 BTU/hr 750 BTU/hr
Injection Plant West (SOHIO)	--		--	5@ 16 2@ 50 mmBTU/hr	1039.4 +4@ 4 + *750 mmBTU/hr	4@ 4 5@ 16 2@ 50 mmBTU/hr +750 mmBTU/hr
		3993.2			2718.2	

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TABLE 3-1

LIST OF ANTICIPATED NEW EMISSION SOURCES

Location	Equipment	Rating	Quantity
Seawater Treatment Plant	Gas Heaters	110 mm Btu/hr	3
		60 mm Btu/hr	2
East Injection Plant	Combustion Turbines	16 MHP	5
	Gas Heaters	50 mm Btu/hr	2
West Injection Plant	Combustion Turbines	16 MHP	5
	Gas Heaters	50 mm Btu/hr	2

Waterflood

330 mm BTU
120 mm BTU
100 mm BTU
100 mm BTU
650 mm BTU/hr.

ADDITION

300 mm BTU/hr.
750
750
1800

1800
650
TOTAL = 2450 mm BTU/hr.

TABLE 5.0-1

EMISSION CHARACTERISTICS OF PROPOSED FACILITY ADDITIONS
TO PRUDHOE BAY OIL FIELD

Facility Description	UTM (East)	UTM (North)	TSP[a] g/s	TSP[a] t/y	SO_2[a] g/s	SO_2[a] t/y	NO_x[a] g/s	NO_x[a] t/y	HC[a] g/s	HC[a] t/y	CO[a] g/s	CO[a] t/y	Stack Parameters[b] HS(m)	DS(m)	Ts(°K)	Vs(m/s)
A.R.Co. Central Compressor Plant Gas Fired Turbine/ Compressors 3 @ 25,000 Horsepower (hp) Each	443.7	7,802.2	1.395	48.5	0.059	2.1	41.17	1432.0	4.20	145.5	11.42	398.0	26.8	2.43	755	50.6
A.R.Co. Flow Station No. 2 Gas Fired Turbine/Compressors 2 @ 25,000 hp Each	449.5	7,795.5	0.920	32.0	0.038	1.4	27.06	945.0	2.77	95.8	7.53	262.0	26.8	2.43	755	50.6
Sohio Central Power Plant Gas Fired Turbine/Generators 2 @ 50 MW (67,000 hp) Each	437.5	7,797.2	2.510	87.4	0.107	3.7	73.80	2578.0	7.51	261.9	20.56	716.8	16.7	2.80	755	102.1
Sohio Gathering Center No. 2 Gas Fired Turbine/ Compressors 2 @ 32,500 hp Each	430.0	7,801.8	1.196	41.6	0.050	1.8	35.16	1228.0	1.80	124.6	9.78	340.6	16.7	2.69	755	60.0
Sohio Gathering Center No. 3 Gas Fired Turbine/ Compressors 2 @ 17,000 hp Each	436.7	7,798.5	0.598	20.8	0.024	1.0	17.58	614.0	0.90	62.2	4.90	170.4	16.7	2.69	755	35.0
Total Yearly Emissions:				230.3		10.0		6,797.0		690.0		1,887.8				
Emission Factors: (lb/MMCF Gas Burned)				14.0[c]		0.6[d]		413.0[c]		42.0[c]		115.0[c]				

(a) Indicated emissions are gram per sec (g/s) and tons per year (t/y) for maximum continuous operation.
(b) Indicated stack parameters are stack height (HS) in meters (m), stack diameter (DS) in meters (m), stack exit temperature (Ts) in degrees Kelvin (°K), and stack exit velocity (Vs) in meters per second (m/s).
(c) Emission factors taken from EPA AP-42 document for natural gas fired turbines.
(d) SO_2 emission factor based on natural gas fired boiler.

INCREMENT II

TABLE 3-1

LIST OF ANTICIPATED NEW EMISSIONS SOURCES

Location	Equipment	Rating	Quantity
SOHIO Gathering Center 1	Combustion Turbines	3.5 MHP	2
		1.4 MHP	1
		22.6 MHP	4
	Gas Heaters	42.5 mm Btu/hr	2
		5.0 mm Btu/hr	1
		310.5 mm Btu/hr	1
SOHIO Gathering Center 2	Combustion Turbines	3.5 MHP	2
		1.4 MHP	1
		22.6 MHP	4
		26.6 MHP	3
	Gas Heaters	42.5 mm Btu/hr	3
		310.5 mm Btu/hr	1
		5.0 mm Btu/hr	1
SOHIO Gathering Center 3	Combustion Turbines	3.5 MHP	2
		1.4 MHP	1
		22.6 MHP	4
	Gas Heaters	42.5 mm Btu/hr	2
		5.0 mm Btu/hr	1
		310.5 mm Btu/hr	1
SOHIO Well Pads A, B, C, D, E, F, G, H, J, M, N, Q, R, S, X, Y.	Gas Heaters	10.0 mm Btu/hr	16 (1 per pad)
Central Compressor Plant	Combustion Turbine	25.0 MHP	1
	Gas Heater	26.0 mm Btu/hr*	1
ARCO Flow Station 1	Combustion Turbines	5.0 MHP	2
		36.0 MHP	3
ARCO Flow Station 2	Combustion Turbines	36.0 MHP	4
		5.0 MHP**	2
	Gas Heater	100.0 mm Btu/hr	1
ARCO Flow Station 3	Combustion Turbines	36.0 MHP	4
		5.0 MHP**	2
SOHIO Gathering Centers	Fuel Oil Storage Tanks	42,000 gallons	3 (1 per center)

* Previously permitted by State in June 1979.

**One of these units was previously permitted by the State in June 1979.

42 turbines
31 heaters